RDECOM G4/9
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Airborne Lead Reduction Program

Environmental Quality Technology Pollution Prevention Program

Purpose: Reduce or eliminate airborne lead released from energetic materials by developing, testing, and demonstrating lead-free primary explosives for primers and detonators and lead-free propellants for rockets and missiles.

Current occupational exposure levels are not protective of Soldier and range personnel health

Requirement: Exposure to airborne lead poses a substantial risk to our Soldiers, workers and the surrounding communities. The EPA has stated that there is no safe exposure level to lead. A 2013 study by the National Research Council, entitled "Potential Health Risks to DoD Firing-Range Personnel from Recurrent Lead Exposure," determined that workers at firing ranges and shoot houses are routinely exposed to unsafe levels of airborne lead and that the current occupational exposure levels are not protective of worker health. In addition, the EPA, under the Clean Air Act, revised the primary and secondary National Ambient Air Quality Standard (NAAQS) for lead to 0.15 µg/m^3—ten times more stringent than the previous standard—and increased the associated monitoring requirements. All U.S. counties will need to be in attainment with the revised NAAQS no later than 2017. Installations involved in live-fire training and testing must determine the amount of lead released by normal operations and may need to adopt lead reduction technologies to comply with NAAQS implementation within their state/county as well as potential changes to the occupational exposure limits at firing ranges and shoot houses.

Technical Approach:

- Develop and demonstrate lead-free primary explosives for use in primers and detonators
  - Evaluate copper based primary explosives in detonators as alternatives to lead azide
  - Optimize production and loading processes for novel materials to reduce costs and safety hazards
  - Formulate lead-free primer formulations using novel chemistries to replace lead styphnate
- Develop lead-free ballistic modifiers for reduced lead or lead-free extrudable propellants for 2.75" rockets and for castable, minimum signature rocket propellants

Benefit to the Warfighter:

- Avoid future range closures, restrictions, personnel removal and/or the need to install costly pollution control equipment at firing ranges and 95+ shoot houses due to high Warfighter/worker exposure to lead
- Address growing health concerns with lead by proactively replacing lead-based primers, detonators and rocket propellants found in 3,000+ unique Army munitions (all classes) used regularly in U.S.-based training, including 500M primers and 150K rockets per year on ranges
  - EPA: no safe exposure level to lead
  - NRC: current OSHA PEL not protective of Soldiers/workers
  - Army: anticipates reducing acceptable blood lead levels in Soldiers and range personnel
- Avoid monitoring costs and potential training/testing restrictions on lead-based energetic materials at ranges located in non-attainment areas for revised NAAQS

Lead-based rocket propellants are among the largest sources of airborne lead from training activities